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**DRAFT CLAIMS** – Privileged
Inventor: Roca, Alberto
Application No: 09/358,103

55. **A purified mutant RecA protein comprising SEQ ID NO: 3 and having an enhanced DNA binding activity compared to an unmutated RecA protein from the same source, wherein a naturally occurring amino acid residue, located within said sequence, is replaced with an amino acid residue which is volumetrically larger than the replaced amino acid residue.**

56. The purified mutant RecA protein of claim 55, wherein said replacement occurs at residue 4 of SEQ ID NO: 3.

57. The purified mutant RecA protein of claim 55, wherein said replacement occurs at residue 13 of SEQ ID NO: 3.

58. The purified mutant RecA protein of claim 55, wherein said replacement occurs at residue 14 of SEQ ID NO: 3.

59. The purified mutant RecA protein of claim 55, wherein said replacement occurs at residue 15 of SEQ ID NO: 3.

60. The purified mutant RecA protein of claim 55, wherein said replacement occurs at residue 16 of SEQ ID NO: 3.

61. The purified mutant RecA protein of claim 55, wherein said replacement occurs at residue 20 of SEQ ID NO: 3.

62. The purified mutant RecA protein of claim 55, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

63. The purified mutant RecA protein of claim 56, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.



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64. The purified mutant RecA protein of claim 57, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

65. The purified mutant RecA protein of claim 58, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

66. The purified mutant RecA protein of claim 59, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

67. The purified mutant RecA protein of claim 60, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

68. The purified mutant RecA protein of claim 61, wherein said replacement amino acid residue is selected from the group of phenylalanine, lysine, tyrosine, arginine, and tryptophan.

**69. A purified mutant RecA protein comprising SEQ ID NO: 3 and having an enhanced DNA binding activity compared to an unmutated RecA protein from the same source, wherein a naturally occurring amino acid residue, located within said sequence, but excluding residues 8 and 12 of SEQ ID NO: 3, is replaced with an aromatic amino acid residue.**

70. The purified mutant RecA protein of claim 69, wherein said replacement occurs at residue 1 of SEQ ID NO: 3.



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71. The purified mutant RecA protein of claim 69, wherein said replacement occurs at residue 3 of SEQ ID NO: 3.

72. The purified mutant RecA protein of claim 69, wherein said replacement occurs at residue 5 of SEQ ID NO: 3.

73. The purified mutant RecA protein of claim 69, wherein said replacement occurs at residue 11 of SEQ ID NO: 3.

74. The purified mutant RecA protein of claim 69, wherein said replacement occurs at residue 17 of SEQ ID NO: 3.

75. The purified mutant RecA protein of claim 69, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

76. The purified mutant RecA protein of claim 70, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

77. The purified mutant RecA protein of claim 71, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

78. The purified mutant RecA protein of claim 72, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

79. The purified mutant RecA protein of claim 73, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.



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80. The purified mutant RecA protein of claim 74, wherein said replacement amino acid residue is selected from the group of tryptophan, tyrosine, phenylalanine, and histidine.

**81. A purified mutant RecA protein comprising SEQ ID NO: 3 and having an enhanced DNA binding activity compared to an unmutated RecA protein from the same source, wherein a naturally occurring amino acid residue located at residues 8 or 12 of SEQ ID NO: 3, is replaced with a tryptophan residue.**

**82. A method of generating a mutant RecA protein having enhanced DNA binding activity, comprising substituting an amino acid residue in SEQ ID NO: 3, with a volumetrically larger amino acid residue.**

83. The method of claim 82, wherein said volumetrically larger amino acid residue is substituted at residue 4 of SEQ ID NO: 3.

84. The method of claim 82, wherein said volumetrically larger amino acid residue is substituted at residue 13 of SEQ ID NO: 3.

85. The method of claim 82, wherein said volumetrically larger amino acid residue is substituted at residue 14 of SEQ ID NO: 3.

86. The method of claim 82, wherein said volumetrically larger amino acid residue is substituted at residue 15 of SEQ ID NO: 3.

87. The method of claim 82, wherein said volumetrically larger amino acid residue is substituted at residue 16 of SEQ ID NO: 3.

88. The method of claim 82, wherein said volumetrically larger amino acid residue is substituted at residue 20 of SEQ ID NO: 3.



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89. The method of claim 82, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

90. The method of claim 83, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

91. The method of claim 84, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

92. The method of claim 85, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

93. The method of claim 86, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

94. The method of claim 87, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

95. The method of claim 88, wherein said volumetrically larger amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.



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**96. A method of generating a mutant RecA protein having enhanced DNA binding activity, comprising substituting a non-aromatic amino acid residue in SEQ ID NO: 3, with an aromatic amino acid.**

97. The method of claim 96, wherein said non-aromatic amino acid residue is substituted at residue 1 of SEQ ID NO: 3.

98. The method of claim 96, wherein said non-aromatic amino acid residue is substituted at residue 3 of SEQ ID NO: 3.

99. The method of claim 96, wherein said non-aromatic amino acid residue is substituted at residue 5 of SEQ ID NO: 3.

100. The method of claim 96, wherein said non-aromatic amino acid residue is substituted at residue 11 of SEQ ID NO: 3.

101. The method of claim 96, wherein said non-aromatic amino acid residue is substituted at residue 17 of SEQ ID NO: 3.

102. The method of claim 96, wherein said aromatic amino acid residue is selected from the group consisting of tryptophan, tyrosine, phenylalanine, and histidine.

103. The method of claim 97, wherein said aromatic amino acid residue is selected from the group consisting of tryptophan, tyrosine, phenylalanine, and histidine.

104. The method of claim 98, wherein said aromatic amino acid residue is selected from the group consisting of tryptophan, tyrosine, phenylalanine and histidine.



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105. The method of claim 99, wherein said aromatic amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

106. The method of claim 100, wherein said aromatic amino acid residue is selected from the group consisting of phenylalanine, lysine, tyrosine, arginine and tryptophan.

107. The method of claim 101, wherein said aromatic amino acid residue is selected from the group consisting of tryptophan, tyrosine, phenylalanine, and histidine.

**108. A method of generating a mutant RecA protein having enhanced DNA binding activity, comprising substituting the naturally occurring amino acid residue located at residues 8 or 12 of SEQ ID NO: 3, with a tryptophan residue.**

109. The purified RecA mutant protein of claim 55, wherein said protein is derived from a bacterial, eukaryotic, archaeal, or viral RecA protein.

110. The purified RecA mutant protein of claim 69, wherein said protein is derived from a bacterial, eukaryotic, archaeal, or viral RecA protein.

111. The purified RecA mutant protein of claim 81, wherein said protein is derived from a bacterial, eukaryotic, archaeal, or viral RecA protein.



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